

REMARKS

This Amendment, submitted in response to the Office Action dated September 7, 2006, is believed to be fully responsive to each point of rejection raised therein. Accordingly, favorable reconsideration on the merits is respectfully requested.

Claims 1-18 are all the claims pending in the application.

I. Rejection of claims 1, 2, 5, 6, 11, and 12 under 35 U.S.C. § 103

Claims 1, 2, 5, 6, 11, and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Murakami et al. (U.S. Patent No. 6,158,844) in view of Brescia et al. (U.S. Patent No. 4,502,054).

Claim 1

Claim 1 recites “an ink guide whose tip end portion is directed toward a side of said recording medium” and “an ink flow path that supplies the ink to said ink guide.” The Examiner cites Murakami, col. 3, line 56-col. 4, line 9, for teaching this aspect of the claim.

Claim 1 further recites “an ejection electrode that comprises a surrounding electrode arranged so as to surround an outer periphery of said ink guide with a predetermined spacing, and ejects the ink guided from said ink flow path to the tip end portion of said ink guide by means of the electrostatic force...” The Examiner asserts that Murakami Fig. 21 and col. 5, lines 14-47 teaches this aspect of the claim.

Claim 1 also recites “wherein a ratio between an effective inside diameter of said surrounding electrode and a distance from said surrounding electrode to a tip end of said ink guide protruding on the side of said recording medium is set in a range of 1:0.5 to 1:2.”

The Examiner concedes that Murakami does not teach this aspect of the claim and cites Brescia, Figs. 3, 3A, col. 4, lines 7-24, to cure the deficiency. However, Brescia does not teach this aspect of the claim. The respective column and lines cited by the Examiner discloses that the inner diameter of an electrode 37 is at a minimum equal to the outer diameter of a nozzle 36 to a maximum of 1mm. However, although Brescia discloses an inner diameter of the electrode 37, there is no teaching or suggestion regarding a ratio between the inner diameter of the electrode and the distance from the electrode to a tip end of an ink guide. Most likely because Brescia does not even teach or suggest the use of an ink guide having a tip end portion. Consequently, Brescia does not teach **a ratio between an effective inside diameter of said surrounding electrode and a distance from said surrounding electrode to a tip end of said ink guide protruding on the side of said recording medium is set in a range of 1:0.5 to 1:2**, as claimed.

Moreover, the combination of Brescia with Murakami is not obvious. Neither Murakami nor Brescia is concerned with a ratio between the inner diameter of an ejection electrode and the distance from the ejection electrode to the tip end of an ink guide. Further, Brescia does not teach or suggest a ratio between an inside diameter of the electrode and a distance from the electrode to a tip end of the ink guide, and thus, the present invention is not obvious from the combination of Murakami and Brescia. Consequently, there is no reason why a ratio between an effective inside diameter of said surrounding electrode and a distance from said surrounding electrode to a tip end of said ink guide protruding on the side of said recording medium would be taken into

account. Any suggestion by the Examiner that the combination is obvious is clearly a result of impermissible hindsight upon viewing the Applicant's invention.

Claim 1 in the present application recites an invention having a relationship between an effective length of the ejection electrode and a distance from the ejection electrode to a tip end of the ink guide protruding on the side of the recording medium in a specific range, regardless of the distance between the ejection electrode and the recording medium, to thereby assure stable ejection of ink droplets even if the pulse voltage (driving voltage) which controls the ink ejection/non-ejection is lowered.

Even assuming *arguendo* Murakami could be combined with Brescia to specify an effective length of the ejection electrode and the distance between the ejection electrode and the recording medium, such a combination would not be analogous to having a relationship between an effective length of the ejection electrode and a distance from the ejection electrode to a tip end of the ink guide protruding on the side of the recording medium in a specific range. Thus, from the combination thereof, no one skilled in the art would have arrived at the present invention of claim 1 where the driving voltage (pulse voltage) which controls the ink ejection/non-ejection may be lowered, allowing the voltage necessary for ejection to be reduced, regardless of the distance between the ejection electrode and the recording medium.

Accordingly, the combination of Murakami and Brescia would never arrive at the invention of claim 1 in the present application and may not achieve the effect to reduce the voltage necessary for ejection and to lower the voltage (pulse voltage) which controls the ink ejection/non-ejection, thereby realizing the assured and stable ink ejection.

For at least the above reasons, claim 1 and its dependent claims should be deemed allowable. To the extent claim 3 recites similar elements, claim 3 and its dependent claim should be deemed allowable for at least the same reason.

Claim 6

Claim 6 recites “wherein a contact angle of a surface of said ink guide in at least a portion existing in said through hole with respect to the ink is set larger than a contact angle of an inner wall surface of said through hole with respect to the ink.” The Examiner asserts that Murakami Fig. 19 teaches this aspect of the claim.

Fig. 19 of Murakami discloses that a recording paper 17 moves with respect to an ink guide 50 and that a plurality of separate electrodes can be formed on a flat plate making it possible to easily provide a head of high-resolution by arranging a plurality of rows of separate electrodes so that the separate electrodes of the respective rows are staggered. See col. 21, lines 37-49. However, there is no discussion regarding a contact angle of a surface of an ink guide with respect to ink and a contact angle of an inner wall surface of a through hole with respect to ink.

Since Murakami does not teach this aspect of the claim, claim 6 and its dependent claims should be deemed allowable.

Claim 12

Claim 12 recites “wherein said tip end portion of said ink guide has an affinity for the ink.” The Examiner cites col. 2, lines 36-46 and lines 56-60 of Murakami for teaching this aspect of the claim. The respective column and lines cited by the Examiner disclose an

electrostatic attraction ink jet system. The system causes the flight of very fine particles of ink from a common slit-like nozzle without the need of separate nozzles corresponding to respective picture dots. However, there is no teaching or suggestion that a tip end portion of an ink guide has an affinity for the ink. Consequently, claim 12 should be deemed allowable.

II. Rejection of claims 3 and 4 under 35 U.S.C. § 103

Claims 3 and 4 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Murakami in view of Brescia and Miroku (U.S. Patent No. 4,633,328).

Claim 3 recites “wherein a ratio between an effective spacing between said side-by-side electrodes and a distance from said side-by-side electrodes to a tip end of said ink guide protruding on the side of said recording medium is set in a range of 1:0.7 to 1:2.8.” The Examiner concedes that Murakami does not teach this aspect of the claim and cites Brescia to cure the deficiency.

The respective column and lines cited by the Examiner (col. 7, lines 7-24) discloses that the inner diameter of an electrode 37 is at a minimum equal to the outer diameter of a nozzle 36 to a maximum of 1mm. However, there is no teaching or suggestion regarding a ratio between an effective spacing between side-by-side electrodes and a distance from said side-by-side electrodes to a tip end of said ink guide protruding on the side of the recording medium. Most likely because Brescia does not even teach or suggest the use of an ink guide having a tip end portion. Consequently, Brescia does not teach wherein a ratio between an effective spacing between said side-by-side electrodes and a distance from said side-by-side electrodes to a tip

end of said ink guide protruding on the side of said recording medium is set in a range of 1:0.7 to 1:2.

Moreover, the Examiner is citing the same aspect of Brescia for teaching different elements of the claimed invention. In particular, the Examiner cited the inner diameter values of electrode 37 for teaching the ratio of side-by-side electrodes as recited in claim 3 and for teaching the ratio of a surrounding electrode as recited in claim 1. The Examiner cannot cite the same aspect of a reference for teaching distinctly different claim limitations.

Further, there is no teaching of side-by-side electrodes in Brescia. Therefore, there is absolutely no teaching of a ratio between an effective spacing between **side-by-side electrodes** and a distance from said side-by-side electrodes to a tip end of said ink guide protruding on the side of the recording medium. Any suggestion by the Examiner that such a modification would be obvious would clearly be a result of impermissible hindsight. In addition, such a modification would result in a substantial modification of the principle of operation of Brescia and Murakami which does not require side-by-side electrodes.

Claim 3 also recites “an ejection electrode that comprises **side-by-side electrodes** arranged on both sides of said ink guide so as to oppose each other with a predetermined spacing, and ejects the ink guided from said ink flow path to the tip end portion of said ink guide by means of the electrostatic force...”

The Examiner concedes that Murakami and Brescia do not teach this aspect of the claim and cites Miroku to cure the deficiency.

Miroku discloses a continuous-type ink jet recording apparatus. Miroku describes parallel electrodes, which however do not control the ejection/non-ejection of ink droplets, but deflect the flying direction of ejected ink droplets. Thus, the ejection electrode of the present invention is quite different from the parallel electrodes described in Miroku in terms of the electrode functions.

Further, there is no teaching or suggestion that the side-by-side electrodes eject the ink guided from said ink flow path to the tip end portion of said ink guide by means of the electrostatic force, as claimed. In particular, there is no teaching or suggestion of a **tip end portion of an ink guide** in Miroku, let alone that side-by-side electrodes eject the ink as claimed. Therefore, contrary to the Examiner's assertions, Miroku does not teach the relationship of side-by-side electrodes and the ejection of ink.

For at least the above reasons, claim 3 and its dependent claim should be deemed allowable.

III. Rejection of claims 7 and 10 under 35 U.S.C. § 103

Claims 7 and 10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Murakami as modified by Brescia and in further view of Miura (U.S. Patent No. 4,801,955). Claims 7 and 10 should be deemed allowable by virtue of their dependency to claim 1 for at least the reasons set forth above. Moreover, Miura does not cure the deficiencies of Murakami and Brescia.

Claim 7 recites "wherein said surface of said ink guide in **at least the portion existing in said through hole** has ink-repellent property." The Examiner concedes that Murakami and

Brescia do not teach this aspect of the claim and cites Miura, col. 9, lines 32-48, to cure the deficiency. The respective column and lines cited by the Examiner disclose that an ink repellant layer 55 is formed on the front end face of the projecting nozzle 8 as shown in Fig. 11C. However, the ink repellant layer 55 does not exist in a through hole but is located around the area of a nozzle 8. Consequently, Miura does not teach wherein said surface of said ink guide in at least the portion existing in said through hole has ink-repellent property, as claimed.

Consequently, claim 7 should be deemed allowable. To the extent claim 10 recites similar elements, claim 10 should be deemed allowable for at least the same reasons.

IV. Rejection of claims 8 and 9 under 35 U.S.C. § 103

Claims 8 and 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Murakami as modified by Brescia and in further view of Miyashita et al. (U.S. Patent No. 2002/0136823). Claims 8 and 9 should be deemed allowable by virtue of their dependency to claim 1 for at least the reasons set forth above. Moreover, Miyashita does not cure the deficiencies of Murakami and Brescia.

V. Rejection of claim 13 under 35 U.S.C. § 103

Claim 13 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Murakami as modified by Brescia and in further view of Jonsson (U.S. Patent No. 6,361,147). Claim 13 should be deemed allowable by virtue of its dependency to claim 1. Moreover, Jonsson does not cure the deficiencies of Murakami and Brescia.

VI. Rejection of claims 14 and 15 under 35 U.S.C. § 103

Claims 14 and 15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Murakami in view of Brescia and Suetsugu et al. (U.S. Patent No 5,975,684). To the extent claim 14 recites subject matter similar to claim 1, claims 14 and its dependent claim should be deemed allowable for at least the same reasons.

VII. Rejection of claims 16 and 17 under 35 U.S.C. § 103

Claims 16 and 17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Murakami in view of Brescia and Suetsugu and Miroku. To the extent claim 16 recites subject matter similar to claim 3, claim 16 and its dependent claim should be deemed allowable for at least the same reason.

VIII. New Claim

Applicant has added claim 18 to provide a more varied scope of protection. Claim 18 should be deemed allowable by virtue for their dependency to claim 1 for at least the reasons set forth above. Moreover, the art cited by the Examiner does not teach the elements of claim 18.

Since the new claim 18 depends on claim 13, which depends on claim 1, the new claim 18 should also be deemed patentable. Further, Jonsson does not teach or suggest an ink guide and therefore, there is no disclosure or suggestion of suppressing electric field interferences between the ink guide and the ejection electrodes of adjacent ejection portions.

The exemplary embodiment of the present invention as recited in new claim 18, which is directed to suppressing the electric field interferences occurring between the ink guide and the ejection electrodes of adjacent ejection portions, is not obvious from the combination of

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Attorney Docket No. Q78016

Murakami and Brescia further modified with the guard electrodes of Jonsson. Hence, claim 18 should be allowed.

IX. Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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Respectfully submitted,



Ruthleen E. Uy
Registration No. 51,361

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE
23373
CUSTOMER NUMBER

Date: February 6, 2007